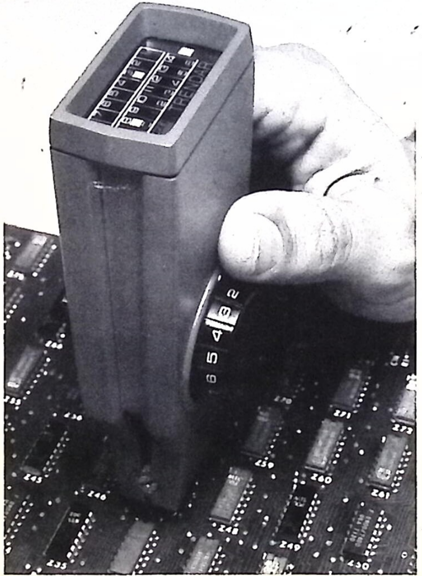
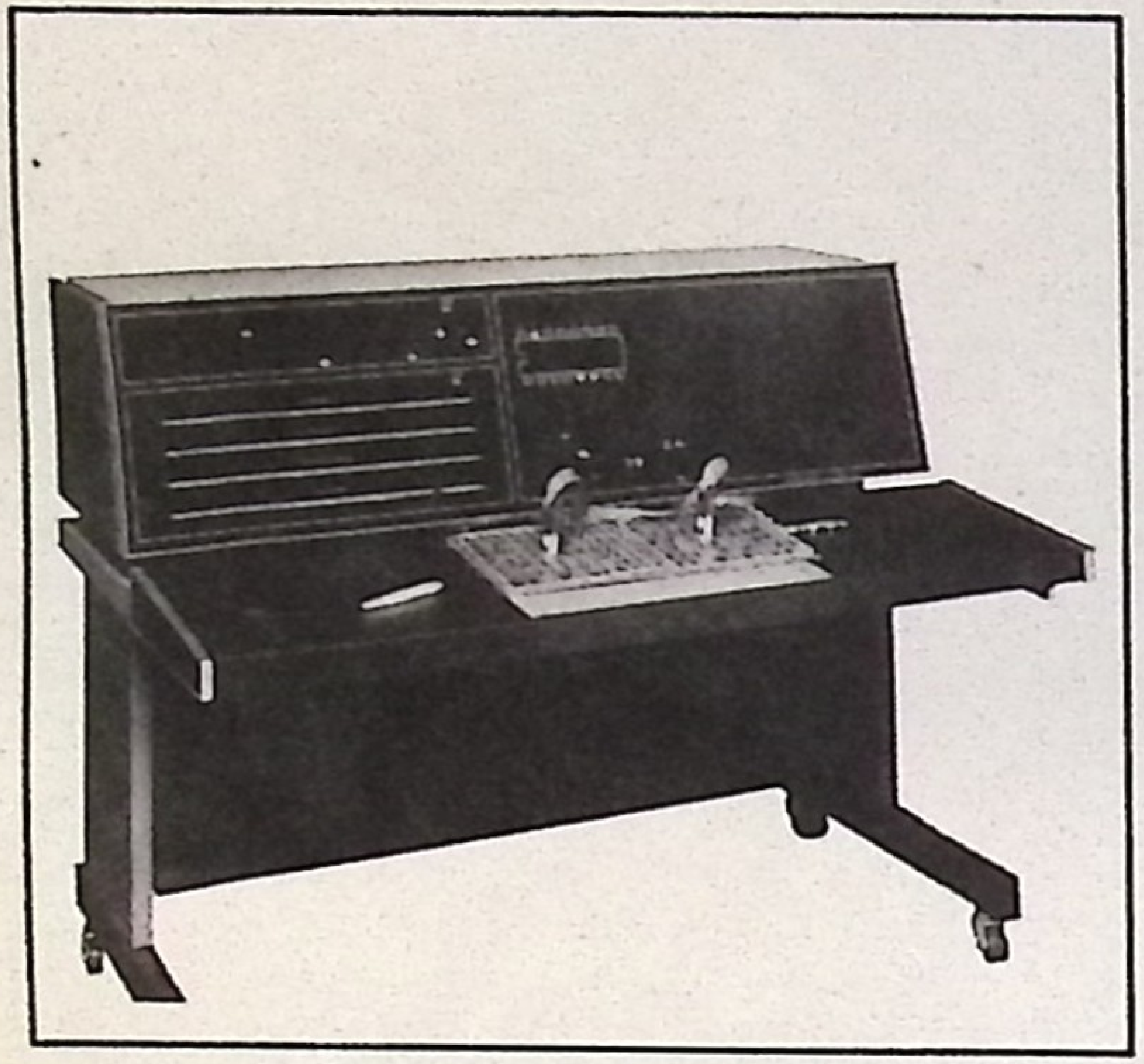
Instruction Manual



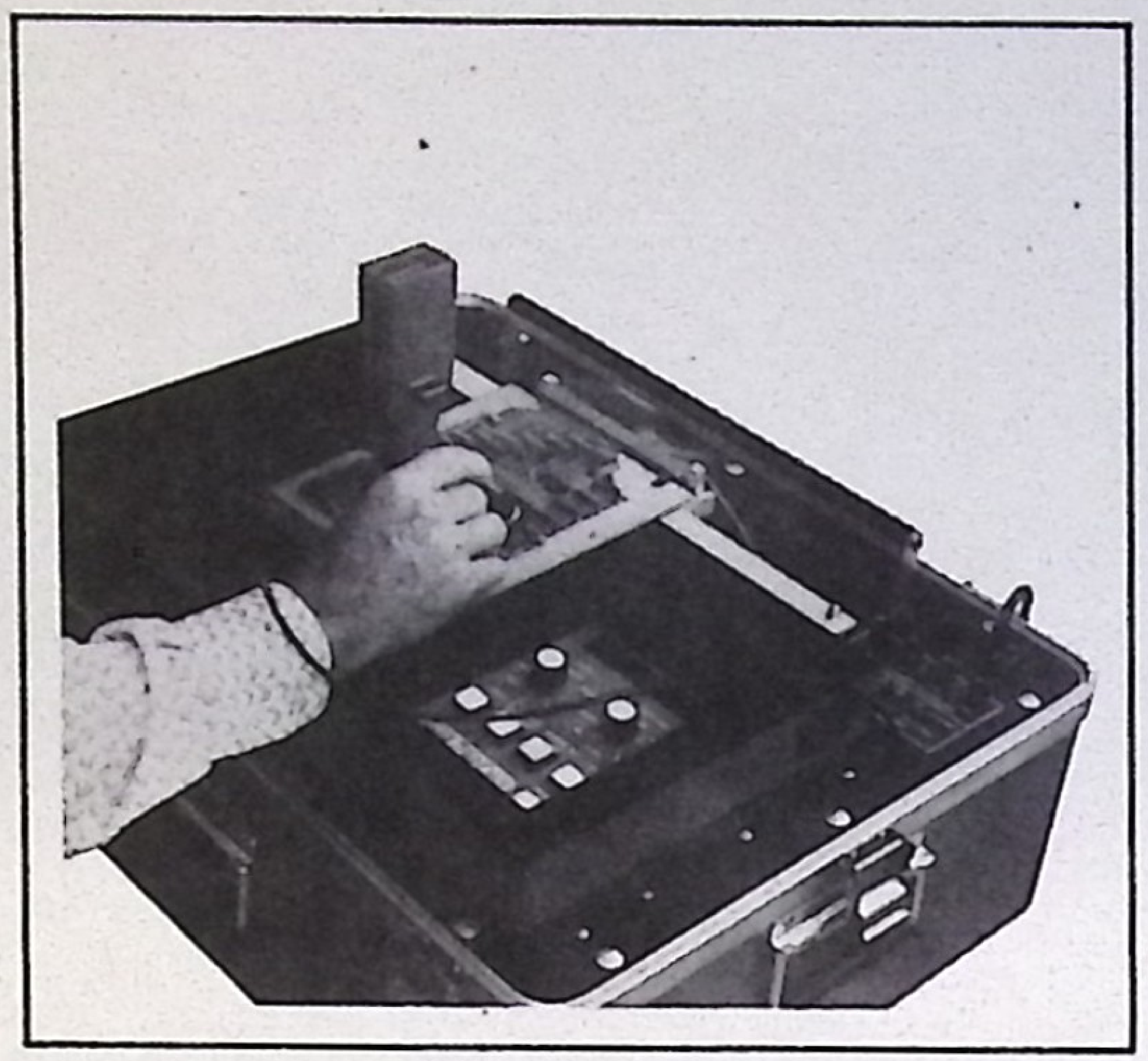
FLUKE®

TRENDAR 200 IC TESTCLIP

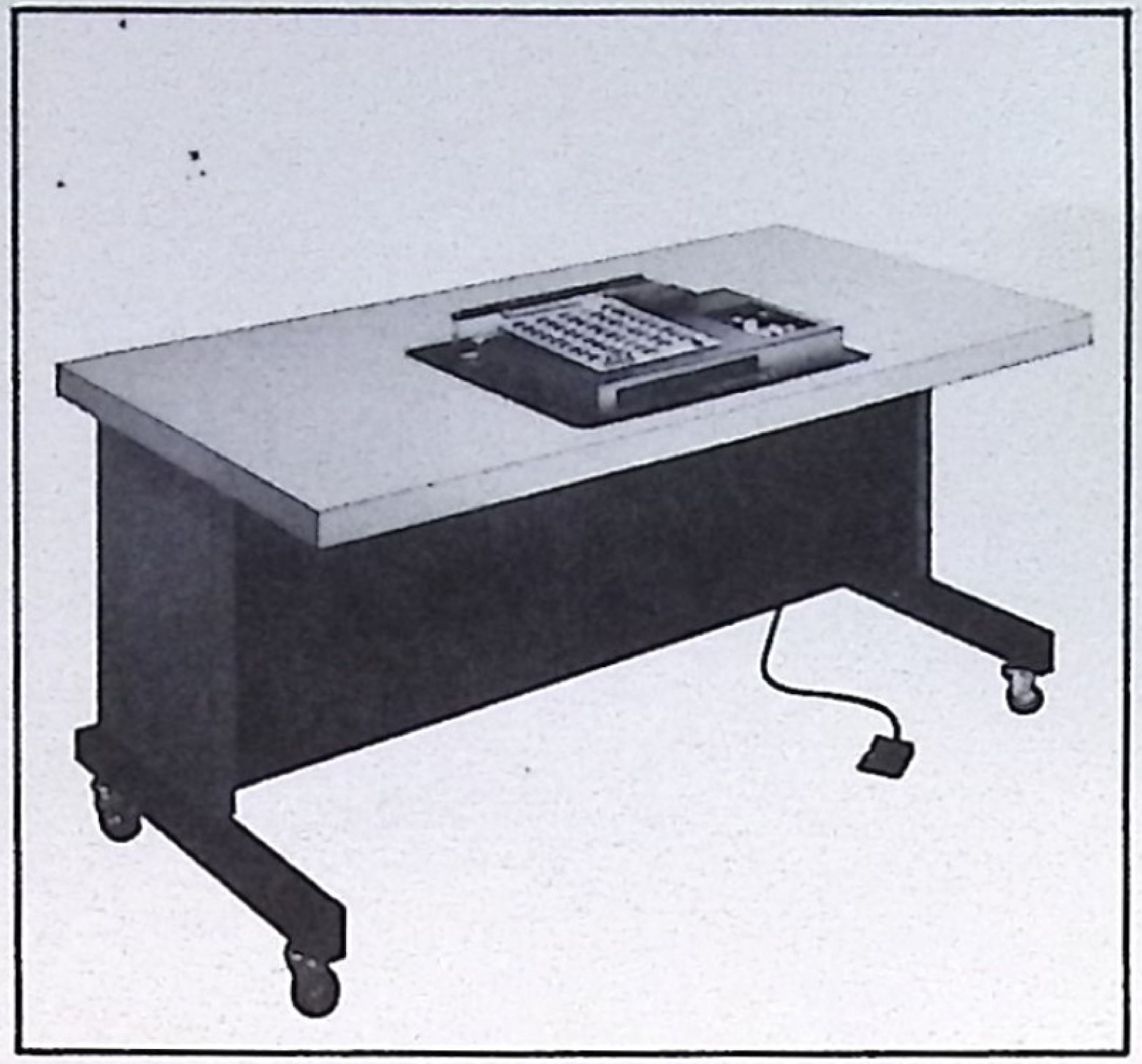
FLUKE TRENDAR Digital Test Products



The TRENDAR 2000A General Purpose Test Station provides automatic testing and rapid fault isolation of digital PC assemblies. Extensive excitation capabilities, simple programming, high test rate and a broad range of troubleshooting tools have proven its superiority in dozens of production test applications throughout the world. The TRENDAR 1000A LOGICTESTER uses the identical pattern generators and test rates. Thus, it is fully program compatible, not only for field service but also as a fault-finding station supporting the TRENDAR 2000A in the factory.



The TRENDAR 1000A LOGICTESTER™ is a low cost, portable digital PC board tester which uses the identical pattern generators and test rates as the Model 2000A. Thus, it is fully program compatible, not only for field service but also as a fault-finding station supporting the TRENDAR 2000A in the factory.



The TRENDAR 1010A TESTER is a low cost Console Tester which uses Pattern and Rate Generators identical to the TRENDAR 1000A and 2000A. That is, it is fully program compatible with those units. The TRENDAR 1010A is ideal for low cost production test applications and supporting the TRENDAR 2000A.

FLUKE TRENDAR 200 IC TESTCLIP

INSTRUCTION MANUAL

NOTE: This manual applies to TRENDAR 200 TESTCLIP serial numbers 01-500 and above. Check the pocket inside the back cover for back-dating sheets for lower serial numbers or for up-dating sheets.

The TRENDAR Digital Test Products . . . . . Facing Page

General Information 2
  Description
  Identification
  Equipment and Accessories
  Warranty

Specifications 3

Operation 4
  Preparation of Reference IC's
  IC Test Operation
  Logic Monitor Operation
  Logic States Operation

Schematic Diagrams, Assembly Drawings and Parts List . . . . Center Fold

How to Use the TESTCLIP 7

Maintenance 9
  Test Procedure
  Disassembly
  ReassemblyTheory of Operation

Abbreviated Operating Instructions . . . . Back Cover

GENERAL INFORMATION

DESCRIPTION

The TRENDAR 200 IC TESTCLIP™ tests a digital integrated circuit (IC), as it is operating in a circuit, by comparing its behavior to a known-good reference IC of the same type.

The TESTCLIP™ has three models to test different logic families: T200-01 for DTL, TTL, and LoVdd CMOS, T200-02 for Hi-Speed TTL, and T200-03 of Hi-Voltage CMOS or HTL. These devices must be packaged in 8-pin, 14-pin, or 16-pin dual-in-line packages (DIP's).

In operation, the TESTCLIP is placed over an IC to be tested and a reference IC of the same type is plugged into the TESTCLIP. Any logic failure at the outputs of the IC being tested will be indicated by the 16 numbered LED's at the top of the TESTCLIP. The numbers correspond to the pin numbers of the IC being tested.

A seventeenth LED allows the operator to monitor the logic level at any pin of the IC being tested, as selected by the rotary switch on the side of the TESTCLIP. A plug-in probe wire extends this capability to allow monitoring of nearby circuit nodes.

The TESTCLIP is completely self-contained, and is powered from the circuit under test.

IDENTIFICATION

Each TRENDAR 200 TESTCLIP is identified by a unique five-digit serial number, stamped on the side of the unit.

T200-01	01-001 to 20-XXX
T200-02	30-001 to 49-XXX
T200-03	50-001 to 70-XXX

Please refer to this number in any correspondence about your TESTCLIP.

EQUIPMENT AND ACCESSORIES

Each TRENDAR 200 TESTCLIP is provided with 10 reference IC sockets with programming pins, a 10" Extender Cable, a 7" Logic Probe and a User's Manual in a carrying case. The carrying case has storage provisions for the TESTCLIP, manual, 35 sockets and the logic probe. In addition, the following accessories are available:

TC 1	16-pin Reference IC sockets, 63 each, plus 250 programming pins in Carrying Case
TC 2	16-pin Reference IC sockets, 25 each, plus 100 programming pins, fills carrying case
TC 3	Replacement 14-pin IC clips, 2 each
TC 4	Replacement 16-pin IC clips, 2 each
TC 5	Replacement Probe
TC 6	14-pin Extender Cable (14-pin IC's)
TC 7	16-pin Extender Cable (14 & 16-pin IC's)
TC 8	Auxilliary Power Supply for use with T200-03

WARRANTY

The TRENDAR 200 TESTCLIP is warranted to be free from defects in materials and workmanship for a period of one year from the date of sale. Effects of normal wear and tear excluded. TRENDAR will repair or replace at its discretion units returned to TRENDAR or its authorized service representative. In case of problems, contact TRENDAR at

500 Clyde Avenue, Mountain View, California (415) 965-0350 for repair authorization and return shipping address. If the unit is not returned in the carrying case, it should be protected on all sides by at least two inches of packing material (foam, bubble-pack, etc.) DO NOT RETURN REFERENCE IC'S WITH THE TESTCLIP. Out-of-warranty repairs (except those required by misuse or abuse) will be performed for a flat rate fee.

SPECIFICATIONS

Supply Voltage/Current Required

Supply Voltage		Current Required		
		@ 5V	@ 10V	@ 15V
200-01	4.5 to 10V	60ma	200ma	
200-02	4.5 to 5.5V	60ma		
200-03	10 to 15V		60ma	100ma

Failure Blanking:

200-01	Nominal 400 nsec @ 5V
200-02	Nominal 100 nsec @ 5V
200-03	Nominal 200 nsec @ 10V

Faults of shorter duration are ignored.

Logic Probe: 12" lead, allows probing nearby circuit nodes

Logic Monitor Display:
Minimum detectable pulse width (nominal)

	@ 5V	@ 10V
200-01	100 nsec	75 nsec
200-02	100 nsec	
200-03		100 nsec

Maximum pulse repetition rate 1 MHz for 200-1, 5 MHz for -02 & -03 (indicated by flashing at approximately 5 per second) Single pulse indication, single flash approximately 100 msec long

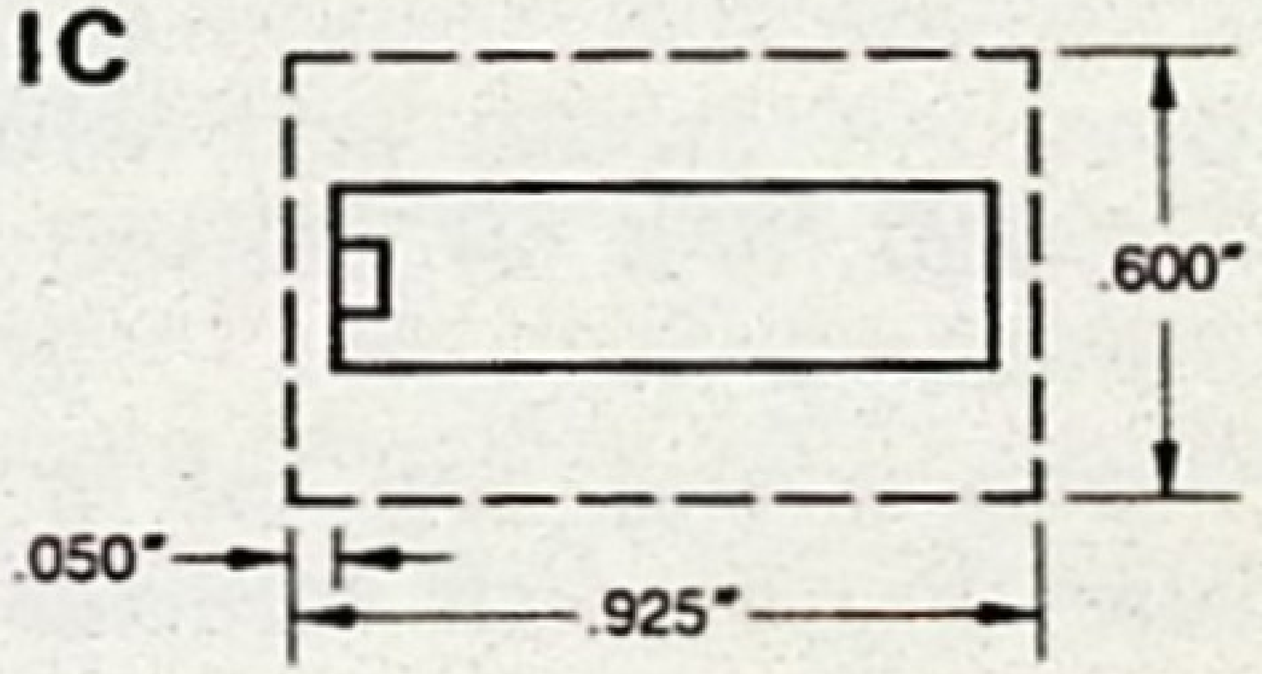
Reference IC Receptacle: Accepts industry standard 16-pin IC socket with 0.025" square posts, 0.635" long posts used for IC inputs, 0.320" long posts used for IC outputs

Size: 2-3/16" x 1-5/16" x 6-1/8" (5.6 cm x 3.3 cm x 15.5 cm)

Weight: 6 oz (170 gm)

Carrying Case: 10"x7-1/2"x3-1/8" (25.4cm x 19cm x 7.9cm)

Clearance required around IC to be tested:



OPERATION

PREPARATION OF REFERENCE IC's

The TRENDAR 200 TESTCLIP tests a digital IC operating in circuit by comparing its behavior to that of a known-good reference IC of the same type. The TESTCLIP determines which pins are inputs and which are outputs from the length of the pins on the socket which carries the reference IC. IC inputs (including Vcc and Ground) require long pins on the socket and outputs require short pins. Each TESTCLIP is supplied with programmable IC sockets and a supply of long and short pins.

> **Note:** Only TRENDAR sockets or equivalent programmable sockets should be used with the TESTCLIP. Do not attempt to "program" a typical wire-wrap socket by shortening the output pins. The end of the cut pin may permanently damage the reference IC receptacle on the TESTCLIP. Such damage will be considered evidence of abuse in violation of the warranty.

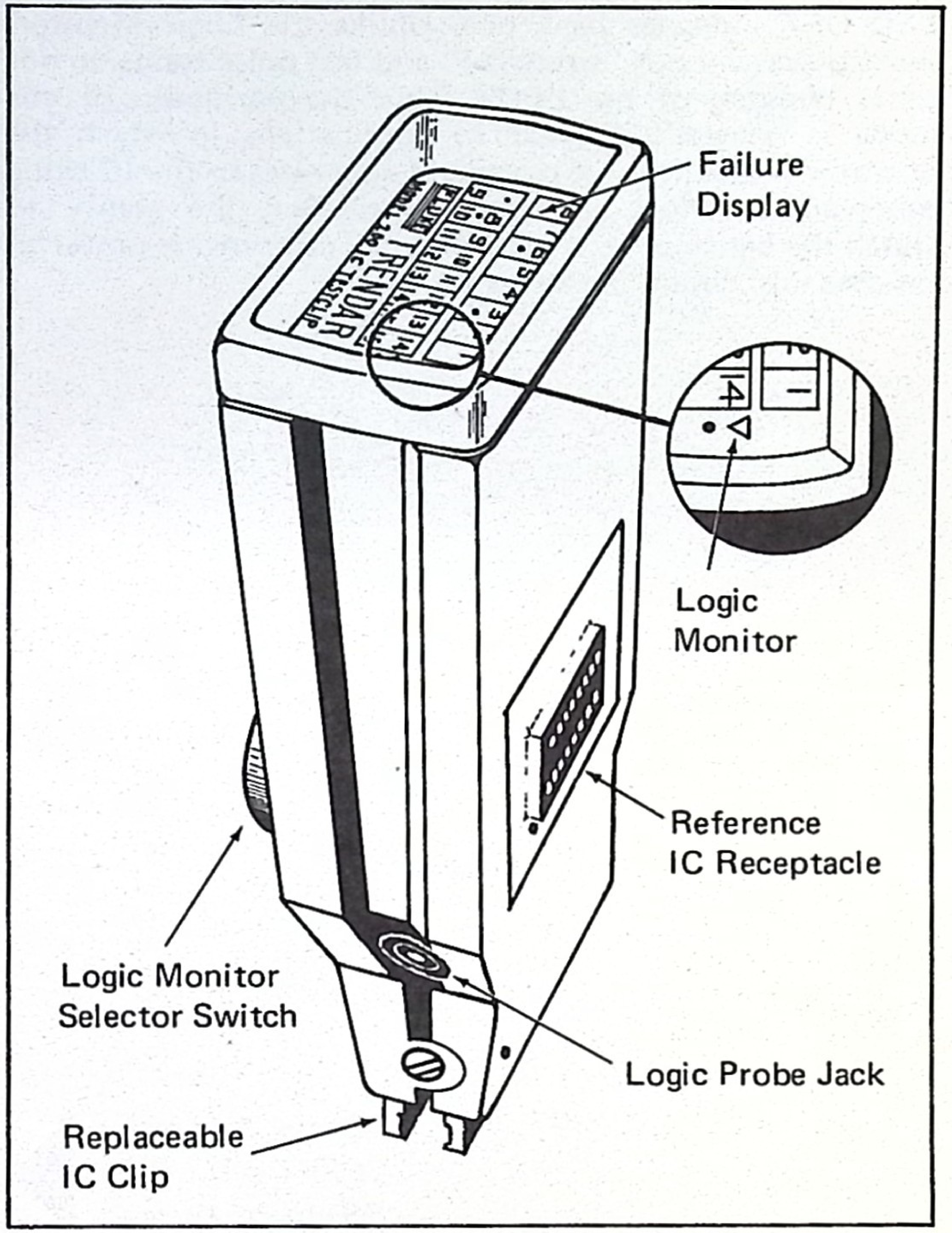
The following procedure is used to prepare a reference IC socket.

1. Examine the IC logic diagram and determine which pins are inputs and which are outputs. Vcc and Ground, and all unused pins should be considered inputs.
2. Remove the top of a reference IC socket by inserting a small screwdriver into the cavity at the end of the socket body and turning the screwdriver.
3. Replace the long pins with short pins from the socket pin kit for the socket holes which correspond to the IC outputs.
4. Snap the socket cover back in place; the arrowhead on the cover should point to pin 1.
5. Insert a known-good reference IC into the socket, making certain that the arrowhead points to the pin 1 end of the IC.
6. If desired, mark the IC and/or the socket body with the IC type number using white marking paint.

IC TEST OPERATION

IC test using the TRENDAR 200 TESTCLIP is performed as follows:

1. Insert a reference IC (mounted in a properly programmed socket) into the receptacle on the side of the TESTCLIP. Be sure that pin 1 of the reference IC is lined up with the white dot at one corner of the receptacle.
2. Set the rotary switch to the pin number which corresponds to Vcc.
3. Squeeze the sides of the TESTCLIP to open the jaws of the IC clip, place the TESTCLIP over the IC to be tested and release. Be sure that the white dot at one corner of the IC clip is located at pin 1 of the



IC being tested. NOTE; take care to fully open the jaws of the IC clip whenever you place the TESTCLIP on or remove it from an IC to minimize wear on the plastic fingers at the end of the IC clip. If the TESTCLIP will not stay firmly on an IC, the IC clip may be worn and need replacement. (If the IC being tested is mounted vertically, it may be necessary to hold the TESTCLIP on the IC.)

4. If the Logic Monitor LED fails to light, it means that there is no power on the IC being tested, or either the reference IC or the TESTCLIP is backwards. If any of the sixteen numbered LED's light, it means that there is a difference in output logic states between the reference IC and the IC being tested, and one of the IC's may be defective. Pages 7 and 8 describe in detail the techniques used to locate the cause of the non-comparison.

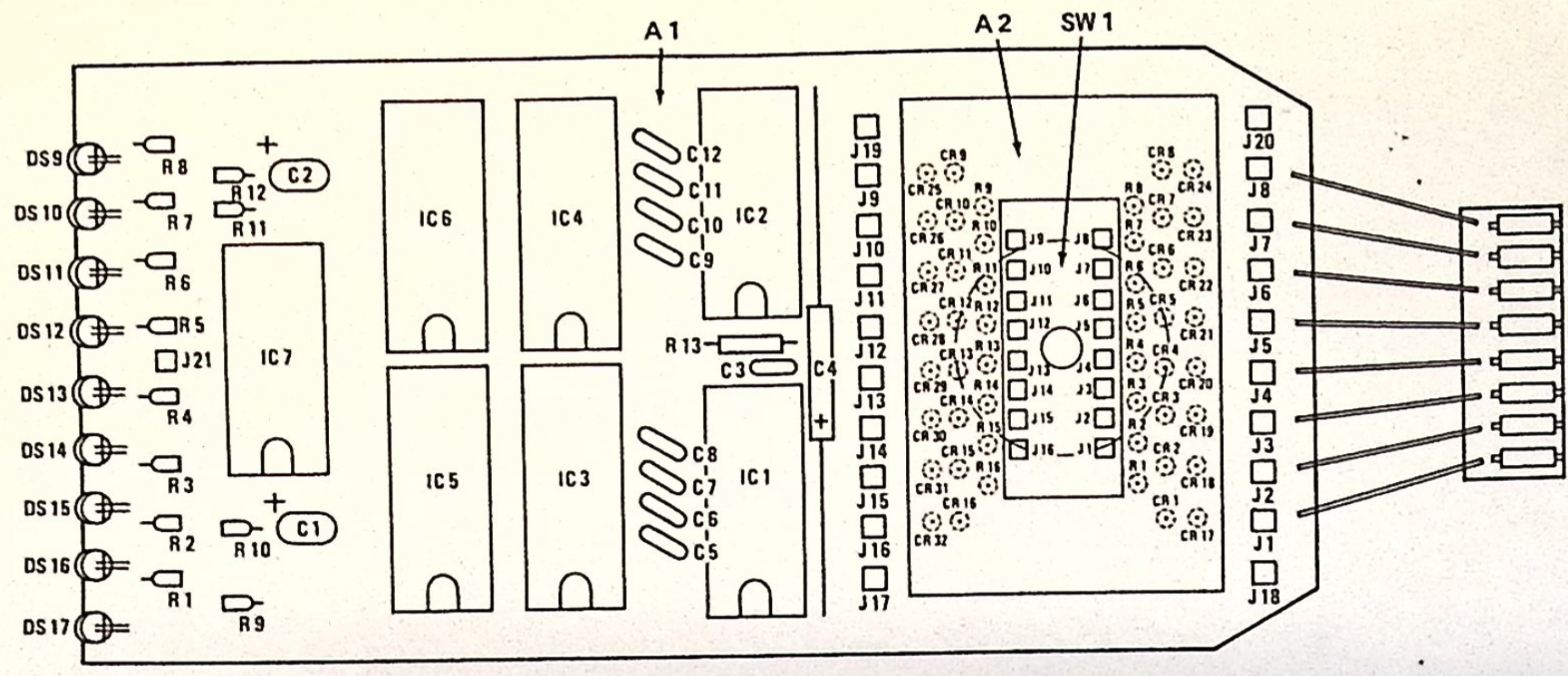
LOGIC MONITOR OPERATION

The Logic Monitor allows the operator to view the logical behavior of any pin on the IC being tested simply by selecting the pin number with the rotary switch on the side of the TESTCLIP. The Logic Monitor LED will be lit for a logic "one" and extinguished for logic zero. Single pulses are "stretched" to light or extinguish the LED for approximately 100 msec. Continuous pulse trains cause the LED to blink at approximately 5 per second. The Logic Probe allows the operator to monitor logic states at nearby circuit nodes. When the Logic Probe is plugged into the side of the TESTCLIP, the Logic Monitor LED displays data from the probe instead of from the IC pin selected by the rotary switch.

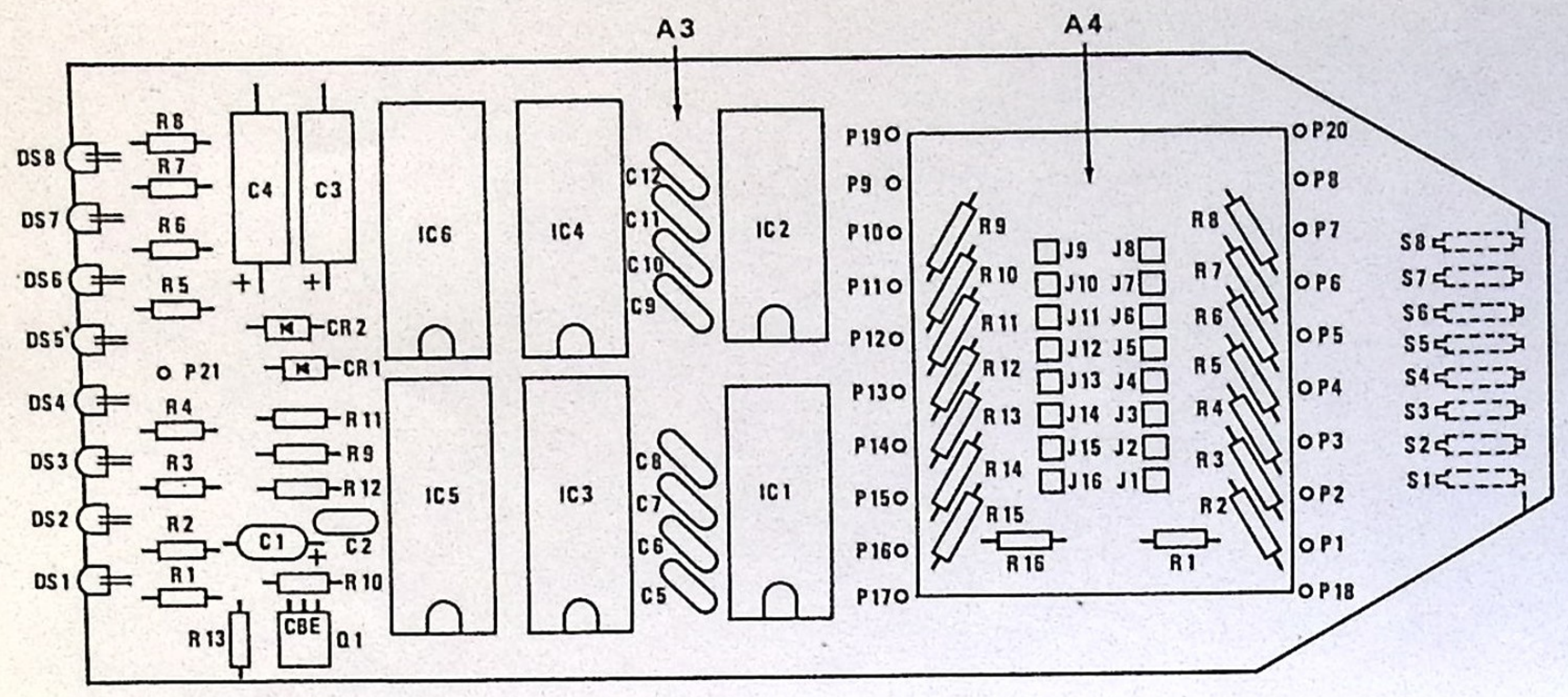
LOGIC STATES OPERATION

Operating the TESTCLIP without a reference IC plugged into the receptacle allows the operator to view the logic states at all pins of the IC being tested simultaneously. The display sense in this mode is the opposite of that of the Logic Monitor. That is LED ON indicates logic zero and LED OFF indicates logic one. Unlike the Logic Monitor, short pulses are not "stretched" and fast pulse trains do not cause blinking of the LED's. Thus the usefulness of this mode is generally limited to applications in which the operator has control of clock and data rates to the IC being observed. In these applications however, the ability to watch the behavior at all pins of an IC can provide powerful insights into circuit performance.

Center fold opens
LEFT and UP for
Schematic Diagram ▶


A1
A2
SW1
IC7
IC6
IC5
IC4
IC3
IC2
IC1
DS9
DS10
DS11
DS12
DS13
DS14
DS15
DS16
DS17
S9
S10
S11
S12
S13
S14
S15
S16

T200-01, 02 PARTS LOCATIONS (Assemblies A1 and A2)

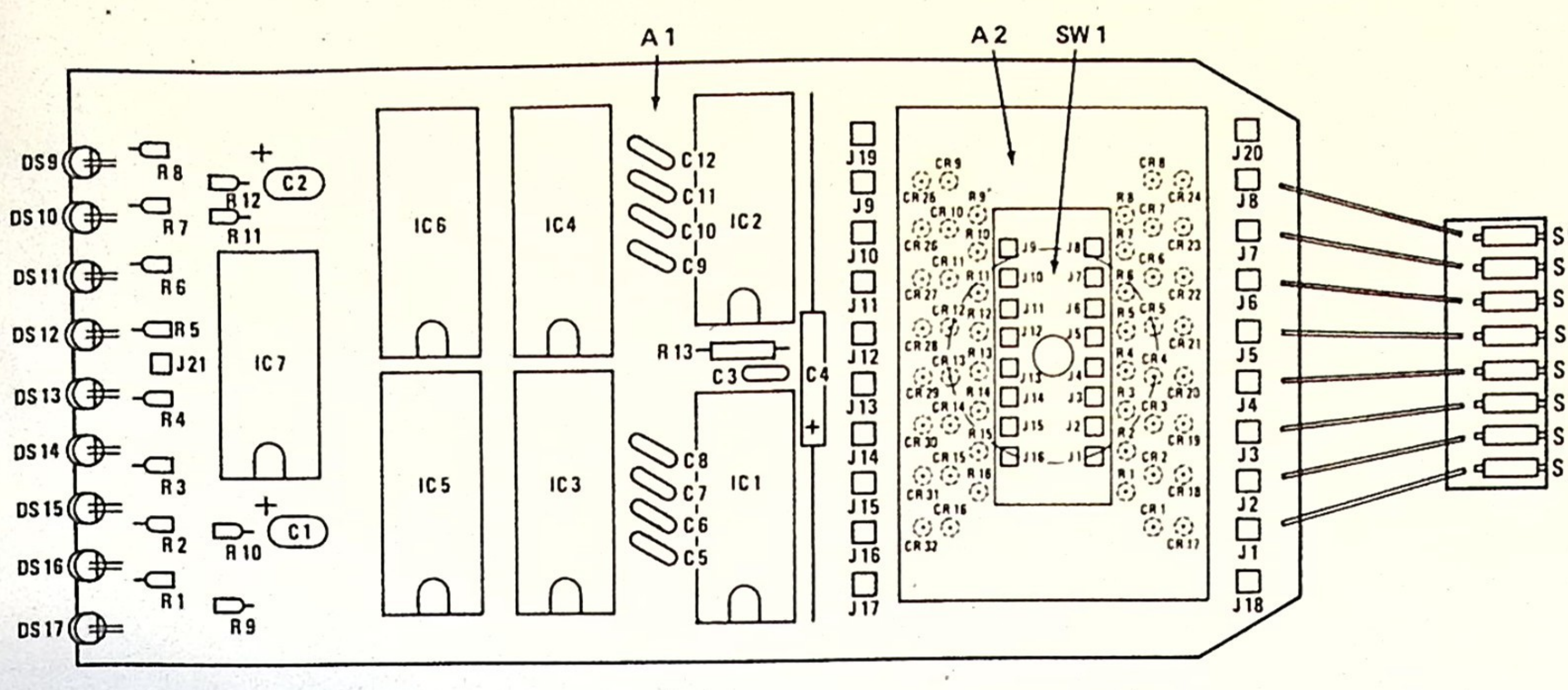

A3
A4
IC6
IC5
IC4
IC3
IC2
IC1
DS1
DS2
DS3
DS4
DS5
DS6
DS7
DS8
Q1
P21

T200-01, 02 PARTS LOCATIONS (Assemblies A3 and A4)

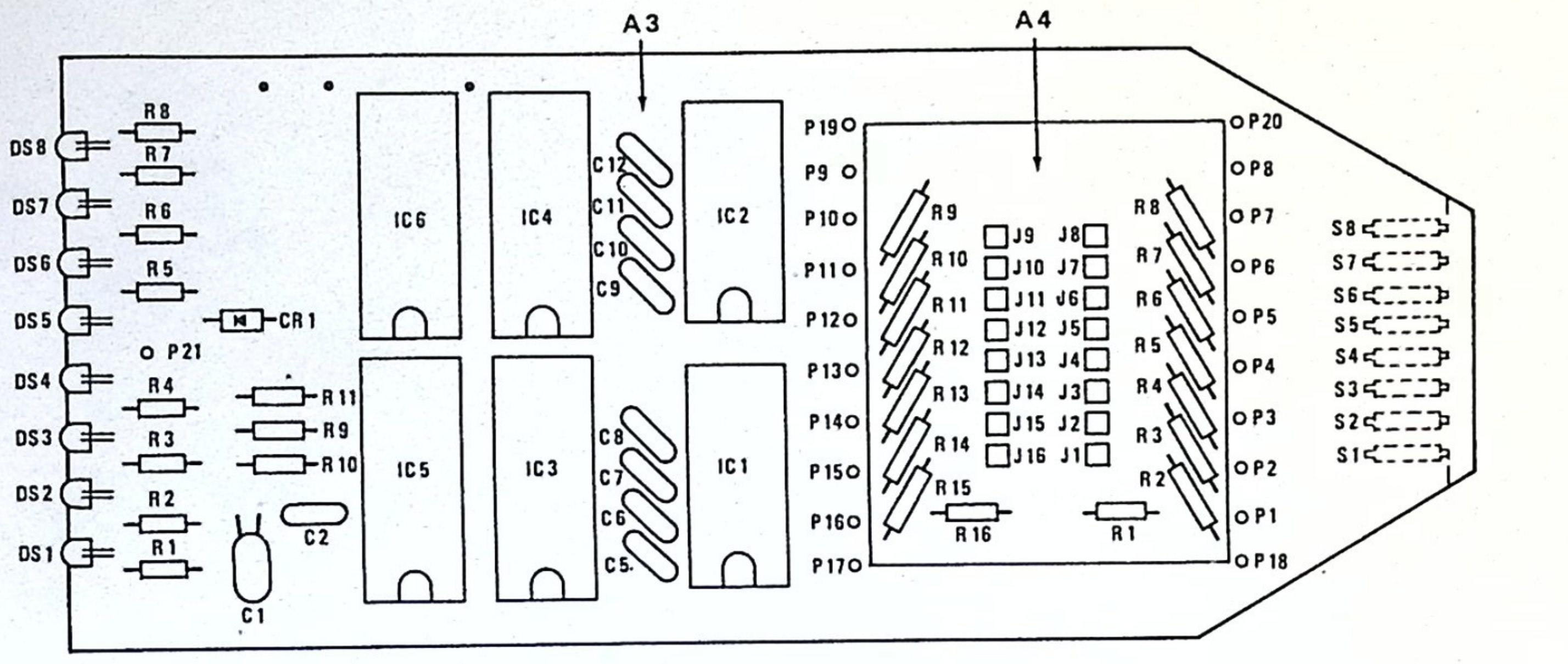
Reference Designation	Description	TRENDAR Part No.
A1	Board Assembly, Comparators 9-16	00250
A1 C1,2	Capacitor, Tantalum, 2.2 uf, 16V	0364-216
A1 C3	Capacitor, Ceramic, 220 pf, 100V	0363-929
A1 C4	Capacitor, Tantalum, 1 uf, 15V	0363-945
A1 C5-12	Capacitor, Ceramic, 100 pf	0200-038*
A1 DS9-17	Light Emitting Diode	0363-978
A1 IC1,2	IC Quad Exclusive OR	0363-952
A1 IC3,4	IC Quad R/S Latch	0363-960
A1 IC5,6	IC Hex Inverter Buffer	0368-548
A1 IC7	IC Quad 2-Input NOR	0200-039
A1 J1-21	Vertical PV Receptacle	0200-005
A1 J-22	Micro-Jack	0200-006
A1 R1-9	Resistor, Carbon, 1/8 W, 5%, 470Ω	0363-887
A1 R10,12,13	Resistor, Carbon, 1/8 W, 5%, 47KΩ	0363-903
A1 R11	Resistor, Carbon, 1/8 W, 5%, 100KΩ	0363-879
A1 S9-16	IC Clip Connector Assy.	00255-010
A1 SW1	Switch, Rotary, 16-Position	0200-007
A2	Board Assembly, Pin Socket (UUT)	00270
A2 CR1-32	Diode IN4448	0363-911
A2 J1-16	Vertical PV Receptacle	0200-005
A2 R1-16	Resistor, Carbon, 1/8 W, 5%, 100KΩ	0363-879
A3	Board Assembly, Comparators 1-8	00260
A3 C1	Capacitor, Tantalum, 2.2 uf, 16V	0200-291
A3 C2	Capacitor, Ceramic, 220 pf, 100V	0363-929
A3 C3,4	Capacitor, Tantalum, 39 uf, 10V	0363-937
A3 C5-12	Capacitor, Ceramic, 100 pf	0200-038*
A3 CR1,2	Diode, IN4448	0363-911
A3 DS1-8	Light Emitting Diode	0363-978
A3 IC1,2	IC Quad Exclusive OR	0363-952
A3 IC3,4	IC Quad R/S Latch	0363-960
A3 IC5,6	IC Hex Inverter Buffer	0368-548
A3 P1-21	Vertical Pins	0200-004
A3 Q1	Transistor	0386-456
A3 R1-8,13	Resistor, Carbon, 1/8 W, 5%, 470Ω	0363-887
A3 R9,10,11	Resistor, Carbon, 1/8 W, 5%, 20KΩ	0363-895
A3 R12	Resistor, Carbon, 1/8 W, 5%, 47KΩ	0363-903
A3 S1-8	Horizontal PV Receptacle	0200-001
A4	Board Assembly, Pin Socket (Ref)	00280
A4 J1-16	Vertical PV Receptacle	0200-005
A4 R1-16	Resistor, Carbon, 1/8 W, 5%, 100KΩ	0363-879
A5	Logic Probe Assembly	00252
A5 R1	Resistor, Carbon, 1/2 W, 10%, 22Ω	0200-015
	Knob Assembly	0200-037

*Not used on T200-02

T200-01, 02 PARTS LIST


A1
A2
SW1
IC7
IC6
IC5
IC4
IC3
IC2
IC1
DS9
DS10
DS11
DS12
DS13
DS14
DS15
DS16
DS17
S9
S10
S11
S12
S13
S14
S15
S16

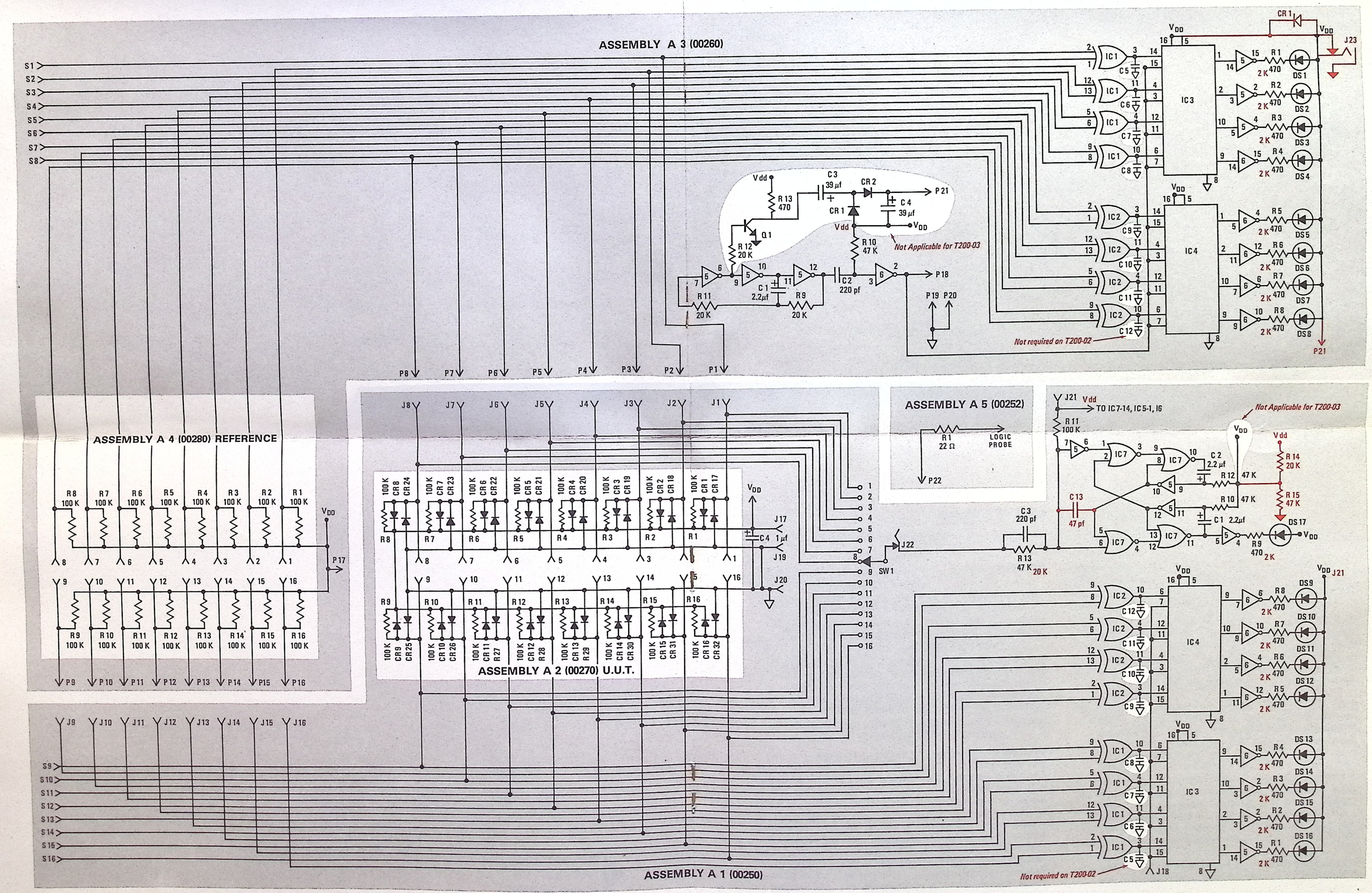
T200-03 PARTS LOCATIONS (Assemblies A1 and A2)


A3
A4
IC6
IC5
IC4
IC3
IC2
IC1
DS1
DS2
DS3
DS4
DS5
DS6
DS7
DS8
P21

T200-03 PARTS LOCATIONS (Assemblies A3 and A4)

Reference Designation	Description	TRENDAR Part No.
A1	Board Assembly, Comparators 9-16	01250
A1 C1,2	Capacitor, Tantalum, 2.2 uf, 16V	0200-291
A1 C3,C5-12	Capacitor, Ceramic, 220 pf, 100V	0363-929
A1 C4	Capacitor, Tantalum, 1 uf, 35V	0363-945
A1 C13	Capacitor, Ceramic, 47 pf, 100V	0200-081
A1 DS9-17	Light Emitting Diode	0363-978
A1 IC1,2	IC Quad Exclusive OR	0363-952
A1 IC3,4	IC Quad R/S Latch	0363-960
A1 IC5,6	IC Hex Inverter Buffer	0368-548
A1 IC7	IC Quad 2-Input NOR	0200-039
A1 J1-21	Vertical PV Receptacle	0200-005
A1 J-22	Miçro-Jack	0200-006
A1 R1-9	Resistor, Carbon, 1/8 W, 5%, 2KΩ	0200-082
A1 R10,12,15	Resistor, Carbon, 1/8 W, 5%, 47KΩ	0363-903
A1 R13,14	Resistor, Carbon, 1/8 W, 5%, 20K	0363-895
A1 R11	Resistor, Carbon, 1/8 W, 5%, 100KΩ	0363-879
A1 S9-16	IC Clip Connector Assy.	0255-010
A1 SW1	Switch, Rotary, 16-Position	0200-007
A2	Board Assembly, Pin Socket (UUT)	00270
A2 CR1-32	Diode IN4448	0363-911
A2 J1-16	Vertical PV Receptacle	0200-005
A2 R1-16	Resistor, Carbon, 1/8 W, 5%, 100KΩ	0363-879
A3	Board Assembly, Comparators 1-8	01260
A3 C1	Capacitor, Tantalum, 2.2 uf, 16V	0200-291
A3 C2,C5-12	Capacitor, Ceramic, 220 pf, 100V	0363-929
A3 CR1	Diode IN4448	0363-911
A3 DS1-8	Light Emitting Diode	0363-978
A3 IC1,2	IC Quad Exclusive OR	0363-952
A3 IC3,4	IC Quad R/S Latch	0363-960
A3 IC5,6	IC Hex Inverter Buffer	0368-548
A3 P1-21	Vertical Pins	0200-004
A3 R1-8	Resistor, Carbon, 1/8 W, 5%, 2KΩ	0200-082
A3 R9,11	Resistor, Carbon, 1/8 W, 5%, 20KΩ	0363-895
A3 R10	Resistor, Carbon, 1/8 W, 5%, 47KΩ	0363-903
A3 S1-8	Horizontal PV Receptacle	0200-001
A4	Board Assembly, Pin Socket (Ref)	00280
A4 J1-16	Vertical PV Receptacle	0200-005
A4 R1-16	Resistor, Carbon, 1/8 W, 5%, 100KΩ	0363-879
A5	Logic Probe Assembly	00252
A5 R1	Resistor, Carbon, 1/2 W, 10%, 22Ω	0200-015
	Knob Assembly	0200-037

T200-03 PARTS LIST


ASSEMBLY A 3 (00260)
ASSEMBLY A 4 (00280) REFERENCE
ASSEMBLY A 2 (00270) U.U.T.
ASSEMBLY A 5 (00252)
ASSEMBLY A 1 (00250)
Not Applicable for T200-03
Not required on T200-02
Not Applicable for T200-03
Not required on T200-02
LOGIC PROBE
TO IC7-14, IC5-1, 16
VDD
J21
J22
J23
SW1
P21
P22

NOTES: 1.) The TRENDAR 200-01 and 02 Testclip Schematic printed in BLACK. 2.) The TRENDAR 200-03 Testclip Schematic differences indicated in COLOR.

SCHEMATIC DIAGRAMS — TRENDAR 200-01, 02, 03 IC TESTCLIP

HOW TO USE THE TESTCLIP

[*For additional information refer to Bulletin 133 FLUKE TRENDAR 200 TESTCLIP* – **HOW TO USE IT!**]

Brief operating instructions for the TRENDAR 200 TESTCLIP are summarized below:

1. Insert reference IC, mounted in programmed socket, into receptacle, with number 1 pin aligned.
2. Set Logic Monitor switch to the Vcc pin number and clip the TESTCLIP on to the IC to be tested, again seeing that pin 1 is properly located.
3. The Logic Monitor should be lit indicating that Vcc is present at the IC being tested and that the TESTCLIP and reference IC are connected properly. If the Logic Monitor is not lit or is blinking, this indicates problems with either Vcc or ground.
4. Observe the sixteen numbered LED's for any indication of non-comparison at IC outputs.

The most important principle to keep in mind when using the TESTCLIP is that lighted LED's indicate that the outputs of the IC being tested do not compare with those of the reference IC. This does not necessarily mean that either IC is defective! The non-comparison may be caused by something on the circuit board: an output held at ground by a solder bridge, for example. Thus, once a non-compare has been identified, this information must be used to find the precise defect on the board. TRENDAR has developed a logical, step-by-step procedure for troubleshooting called FAULTRACK, which is described in detail in Bulletin 122. The key elements in FAULTRACK which apply to use of the TESTCLIP are summarized below:

If the TESTCLIP indicates that IC outputs do not compare, the operator must first eliminate other possible causes of the non-comparison. The most common of these are—

a. Failure to initialize the reference IC when sequential logic elements are being tested. Using the Logic Monitor, the operator must verify that the Reset input to a counter, the Load input to a shift register, etc. is toggling. If not, it will be necessary to set the IC being tested and the reference IC to identical states manually.

b. Wired-OR circuits. An output from the IC being tested may be pulled low by another circuit element connected to it. Since the output of the reference IC is not being pulled low, a non-compare will result. Generally, when such a "wired-OR" is made up of gates which are all in the same IC, a "wired-OR" reference IC can be made and a valid test performed.

c. Marginal levels on, for example, expandable gates. Gates with expander inputs, such as 7452's, and the special gates which are used for expansion, such as a 7460, operate at marginal threshold levels which may indicate non-comparison when tested by the TESTCLIP.

d. Loading which must be left open. Some gates, such as the 7451, have input pins on which no connection is allowed. The TESTCLIP may upset operation of such IC's if the appropriate pins are not insulated.

e. Slow rise time signals. Signals with slow rise times due to coupling or slowdown capacitors, or from some one-shots, may cause false errors when the reference IC and the IC being tested trigger at different times.

If the non-comparison is not a result of conditions such as those outlined above, the operator can assume that he is tracking a genuine fault, proceeding as follows:

1. If the IC being tested is a sequential logic element, the first step is to verify that the inputs are toggling, using the Logic Monitor. If there are inputs which should be toggling and are not, the signal flow is probably being interrupted elsewhere and the TESTCLIP should be moved to the preceding IC(s). If all inputs which should toggle are toggling, move on to the next step.
2. Examine the failing output(s) using the Logic Monitor. If there is logic activity (toggling), go to step 3. If the output pin is stuck at a logic one, go to step 4. If the output pin is stuck at a logic zero, go to step 5.
3. Check adjacent pins and traces for a solder bridge. If there is no solder bridge, replace the IC being tested.
4. Check for a short circuit to Vcc. If there is no short circuit, replace the IC being tested and retest. If this IC still fails, replace the IC connected to it.
5. Check for a short circuit to ground. If there is no short circuit, the failure could be in either the IC being tested, or in an IC connected to it. Depending on the number of fan-out IC's, the fault can be located either by trial change-out or by disconnecting the output of the IC being tested from its fan-out. (Refer to FAULTRACK, Bulletin 122, for more information.)

MAINTENANCE

TEST PROCEDURE

There are no adjustments or preventive maintenance items required for the TESTCLIP. Correct operation may be verified by the following tests:

1. Connect a 100 ma, +5V DC source to pin 1 of the IC Clip. Connect ground to pin 2. LED 2 should be lit, all others, except the Logic Monitor, should be extinguished. Ground Pins 3 through 16, one at a time. In each case, the corresponding LED and the Logic Monitor should light. Repeat this procedure at Pins 3 through 16 of the Reference IC Receptacle; again verifying that each LED lights.
2. With +5V still applied across pins 1 and 2, connect a pulse generator to pin 3. Set the controls for a positive pulse amplitude of +5V, a positive pulse width of 150 nsec and a repetition rate of 1 MHz. With the Logic Monitor Switch set to position 3, the Logic Monitor LED should flash approximately 5 times per second. Repeat for pins 4 through 16.
3. Move the +5V and ground connections to pins 15 and 16 and repeat steps 1 and 2 for pins 1 and 2.
   If the TESTCLIP fails any of these tests, there is a defect which must be isolated and corrected.

DISASSEMBLY

1. To remove the outer case, remove the two slotted nuts at the ends of the IC Clip assembly. The side cover of the TESTCLIP may now be removed.
2. To remove the IC Clip, first slide the IC Clip Connector Board off the IC Clip. **CAUTION: Avoid any strain or unnecessary handling of the wires attached to the IC Clip Connector Board. This assembly is designed for long life in normal service but can be easily damaged by improper handling.** Be careful to slide the board in a straight line, to avoid damaging any of the connectors. Now, holding the TESTCLIP with the switch up and the display away from you, insert a screwdriver blade into the semicircular hole in the side of the TESTCLIP and pry the IC Clip forward towards you until it may be slid out of the case.
3. In order to remove the upper board assembly (00250, comparators 9 to 16), first remove the nut from the Logic Probe jack since the jack must be removed with the board. The board may now be removed simply by grasping the switch knob and pulling the board straight up out of the case. **NOTE: The switch assembly is not field-replaceable. Do not attempt to remove knob or loosen screw. If switch is defective return entire assembly for repair.**
4. The lower board assembly (00260, comparators 1 to 8) is removed simply by removing the four mounting screws which hold it in place.

REASSEMBLY

The TESTCLIP is reassembled by reversing the disassembly process. When re-installing the IC Clip, it is necessary to hold the clip at a slight angle to the horizontal (front end down slightly, like a plow) so the clip body will go under the plastic guides while the threaded shaft will not hit the case of the TESTCLIP. After the clip has been reinstalled, center the threaded shaft in the semi-circular cutouts, as well as side to side. Finally, note that the TESTCLIP must be firmly squeezed to thread the two slotted nuts.

THEORY OF OPERATION

Referring to the schematic drawing, Vdd for the Complementary MOS circuits used in the TESTCLIP is obtained from the power pins on the IC being tested by the diode network made up of A2 CR 1 through A2 CR 32. This circuit will conduct current from the most positive pin to the least positive pin. With +5V DC applied to one pin and another pin grounded, J17 should provide at least 3.5V referred to J19.

Signals from the IC under test enter the TESTCLIP on S1 through S16, making connections to the A2 assembly and from there to the UUT side of the comparator circuits on A1 and A3. Long pins on a Reference IC socket pick up IC input signals at the A2 assembly and carry these to the Reference IC, as well as to the Reference inputs of the comparator circuits via A4. Since short pins are used on the Reference IC socket for outputs, these pins contact the A4 assembly only, so that Reference outputs may be compared to UUT outputs.

Eight comparator circuits (1 through 8) are on Assembly A3 and eight more (9 through 16) are on assembly A1. Referring to the comparator circuit for pin 1, signals from the Reference and UUT IC's are compared by the Exclusive-OR, A3 IC 1. Whenever the inputs at pins 1 and 2 differ, a logic "1" (high level) will appear at pin 3. Capacitor A3 C5 filters out momentary non-compares due to normal timing differences between UUT and Reference. A non-compare which persists for longer than 400 nsec sets the latch (A3 IC 3) causing A3IC3 pin 1 to go high and A3IC 5 pin 15 to go low, turning on the LED, A3 DS1. The LED will remain lit until the first reset pulse after the failure disappears resets A3 IC 3 by a high level on pin 15.

Reset pulses, approximately 2 usec wide, for the comparator latches are generated at a nominal 10 pps rate by the oscillator circuit made up of A3 IC 5, A3 IC 6, A3 R9, A3 R10, A3 R11, A3 C1, and A3 C2. This waveform also goes to the network made up of A3 CR1, A3 CR2, A3 C3, and A3 C4 which shifts its level and rectifies it to provide a +5V Vcc level for the Logic Monitor circuitry. The Logic Monitor consists of J22, A1 SW1, A1 IC7, and associated circuitry. Through A1 SW1, any pin of the IC under test may be connected to the Logic Monitor, while J22 and the Logic Probe extend this capability to nearby circuit nodes. (A5 R1 protects a node being probed from a momentary short to +5V if A1 SW1 is set to the Vcc pin of the UUT at the time the probe is plugged in.) A1 R11, A1 R13 and A1 C3 are signal conditioning to allow the C/MOS Logic Monitor circuits to more accurately detect TTL levels. A1 IC 5, A1 IC 7, A1 C1, A1 C2, A1 R10 and A1 R12 make up a cross-coupled latch such that a high level at A1 IC 5 pin 7 will turn on A1 DS 17 for minimum of 100 msec. Conversely, if the steady state condition at the input of the Logic Monitor is high, a momentary low will extinguish the LED for 100 msec. For example, on a steady state basis, A1 IC 5 pins 9 and 11 will be held high by the pull-ups A1 R12 and A1 R10. If the Logic Monitor input is high, A1 IC 7 pin 4 is low, creating a high at A1 IC 7 pin 11, and a low at A1 IC 5 pin 4, and the LED is turned on. When the Logic Monitor input pulses low, A1 IC 7 pin 4 goes high and pin 11 goes low, turning off the LED.

At the same time, the RC network A1 C1, A1 R10 pulls A1 IC 5 pin 11 low for approximately 100 msec. This keeps the LED extinguished for this period of time, even if the Logic Monitor input returns immediately to a high level. Similar actions occur when the input pulses high from a steady state low condition. When a high frequency signal is present at the Logic Monitor input, the cross-coupling causes the LED to flash approximately five times per second.

REPLACEABLE PARTS

Replaceable parts for the TRENDAR 200 IC TESTCLIP are listed below. These parts are available from Fluke TRENDAR, Service Department, 500 Clyde Avenue, Mountain View, CA 94043, (415) 965-0350. When ordering parts, please give TRENDAR part number, description, instrument model number and serial number.

NOTES

Abbreviated Operating Instructions

① Insert reference IC, mounted in programmed socket, into receptacle, with number 1 pin aligned.

② Set Logic Monitor switch to the Vcc pin number and clip the TESTCLIP on to the IC to be tested, again seeing that pin 1 is properly located.

③ The Logic Monitor should be lit indicating that Vcc is present at the IC being tested and that the TESTCLIP and reference IC are connected properly. If the Logic Monitor is not lit or is blinking, this indicates problems with either Vcc or ground.

④ Observe the sixteen numbered LED's for any indication of non-comparison at IC outputs.

FLUKE TRENDAR subsidiary of John Fluke Manufacturing Company, Inc.

500 Clyde Avenue, Mountain View, California 94043 • 415/965-0350 TWX 910-379-6573
Europe, Fluke (Nederland) B.V., P.O. Box 5053, Tilburg, Netherlands, Tel. 013-673973. Telex. 52273
U.K., Fluke International Corp., Garnett Close, Watford, WD2 4TT, Tel. Watford (0923) 33066, Telex. 934583

Printed in U.S.A. 1274